UNIVERSITI TEKNOLOGI MARA

FLUX PROFILE OF GRAPHENE OXIDE BASED POLYMER MEMBRANE

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ABSTRACT

In this work, dead-end filtration method is used to determine the water flux of commercial ultrafiltration membrane which are MK membrane, BN membrane PZ membrane, and also graphene oxide membrane. Polymer membrane had been widely used in membrane bioreactor and other industrial purposes such as wastewater treatment. One of the characterization of polymer membrane is to study the flux profile of the membrane. It is expected that different flux profile will be obtained for different types of polymer membrane. Generally, membrane with high hydrophilicity will show the ultrafast flow of water across membrane and it is due to low friction generated between water and hydrophobic region of the membrane itself. From this research, BN membrane shows highest water flux (the highest peak) at 174.95 L/m^2.h.bar while the water flux for MK membrane (120.72 L/m^2.h.bar), PZ membrane (14.39 L/m^2.h.bar) and GO membrane (8.89 L/m^2.h.bar).

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INTRODUCTION

1.1 BACKGROUND STUDY

Over the past five decades, the technology of membrane separation has grown rapidly for industrial purposes. There are several number of membrane separation processes that are currently being used such as microfiltration (MF), reverse osmosis (RO), forward osmosis (FO), nanofiltration (NF), pervaporation (PV), ultrafiltration (UF), vapor separation (VP), membrane gas separation and also membrane distillation.(MD). (Ammar, Al-Enizi, AlMaadeed, & Karim, 2016).

Microfiltraton membrane is a porous and can be hydrophilic or hydrophobic and its pore sizing is range between 0.05 and 10 µm.(Sanmartino, Khayet, & García-Payo, 2017) Microfiltration membrane is used to separate compound from aqueous solution with a low hydrostatic pressure which is in the range of 0.01 to 0.5 MPa. According to (Wagner, 2001), microfiltration is a process where only suspended solid is being rejected, even protein can pass the membrane freely. Microfiltration membrane is able to separate large suspended solid for an example: colloid, fat and bacteria. It can also be modified or combine with other membrane separation processes like reverse osmosis (RO), nanofiltration and also with ultrafiltration.

For reverse osmosis, it is widely used for desalination of seawater, production of drinking water and also for wastewater treatment and it is the most energy-efficient technology for desalination where it only produce energy cost that is about 1.8kWh/m3 (Jiang, Li, & Ladewig, 2017). While for forward osmosis, it is depend on the osmotic pressure between two solution that will provide the driving force for permeate water flux (Bogler, Lin, & Bar-Zeev, 2017).

Nanofiltration membrane is used to separate divalent ions and monovalent ions and it is also has higher flux compared to reverse osmosis (RO) (Su, Song, Li, & Gao, 2017). Nanofiltration membrane has a size ranging from 0.1 up to 0.01 µm. For